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ABSTRACT

This chapter reports the responses from 11 colleges and universities in the Netherlands to an international questionnaire as part of a study to investigate the initiation and development of computer facilities in education. Data are presented under the headings: general development and scale of work, purposes of the project or unit, training of non-specialists and consultancy services, courseware development, and expectations of computer based learning. (VT)

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ONDERZOEK EN ONTWIKKELING VAN ONDERWIJS

mededeling 23

juni 1977

C.A. Hawkins

computer based learning 2

computer ondersteund onderwijs

3 The Netherlands – Nederland

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TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC) AND USERS OF THE ERIC SYSTEM."

a survey of the factors influencing its initiation and development

een onderzoek naar de factoren die de invoering en ontwikkeling van COO beïnvloeden

IR005376

List of corresponding projects (11)

University of Amsterdam
Project CAI Development and Dissemination
B. Camstra

University of Amsterdam
Project KIP
D.J. Bierman

Vrije Universiteit, Amsterdam
Project Responsive Environments
A. Dirkzwager

Katholieke Universiteit Nijmegen
Project CAI
M. Leiblum

Rijksuniversiteit Leiden
Project Statistics
J. Moonen

Technische Hogeschool Delft
Project CAI systems
D. Wolbers

Landbouwhogeschool Wageningen
Project Programmeeronderwijs (programming instruction)
C. Nieuwenhuis

Technische Hogeschool Eindhoven
Project CMI
L. Braak

Katholieke Hogeschool Tilburg
CAI Documentation/literature survey
E. van Hees

Technische Hogeschool Twente
Project Digital Techniques
H.A. Vink

Rijksuniversiteit Groningen
Instituut voor Onderwijskunde
W. Wardekker

I. GENERAL DEVELOPMENT AND SCALE OF WORK

Netherlands Table 1 Base of operations

Academic faculty	Computer Centre	Committee	Other
6	2	3	2 *)

One respondent indicates no present project.
Some double entries, as 2 projects have changed base of operations.

Two Netherlands projects are hosted by educational research and development centres that are separate from academic departments, and provide a central service to the university as a whole.

Three are sited in psychology departments.

One project is multi-institutional, answerable to a committee representing 5 universities. Most projects have no steering committee.

*) Depts. of research and development in higher education.

Netherlands Table 2 Main stimulus to establish unit

admin.	staff initiative	student	other
1	10	1	1

There are several multiple responses.

Leiblum at Nijmegen records a combination, with first initiative from a group of interested individuals followed by support from an educational committee, administration, and an advisory committee of the Computing Centre.

Most have had narrower support.
4 narrow staff initiative to one individual, the rest a group from one subject department.

Of those indicating 'other' stimulus, all cite a general program of modernisation of teaching methods, and a need to anticipate the future in underpinning computer utilisation in education with valid research.

Hees reports that the multi-institutional CMI project was initiated by 2 teachers from the Technische Hogeschool Eindhoven Dept. of Mechanical Engineering, which later collaborated with the Education Research Centre at Tilburg.

Netherlands Table 3 Main sources of innovative efforts

administration	committee	faculty group	individual(s)
-	-	3	11

There are multiple entries but the overwhelming response is individual - for five projects, one particular individual mentioned by name; and for a sixth - 'not a group, individual experts'.

All 3 projects indicating 'faculty group innovative effort' cite educational research institutes, two cite Computing Centre.

Science, engineering, psychology faculty groups are also referred to.

Netherlands Table 4 Staffing

(Personnel totalled over all projects)
(recorded as approximate full-time equivalent)

educational psychologists	educationists	computer scientists	lecturers	students/ graduate assistants
5	2 (educational technologists)	7	7 *)	between 10 and 15

Dirkzwager of Amsterdam includes educational psychology, experimental psychology, cognitive psychology, education and computer science; *(Number in team reported elsewhere as 11, but they are probably not full-time).*

Cooperating subject matter departments are:

- Science (Physics, Botany)
- Engineering (Electrical, Mechanical)
- Maths and Statistics
- Medicine

Students are from:

- education (3)
- psychology (2)
- maths (2)
- computer science (2)

*) plus several cooperating staff members (not enumerated)

Netherlands Table 5 Direction of the Project

Only two Netherlands projects are directed by formal committees.

1. Leiblum, Nijmegen, says that their project reports to an Education Committee which reports to the university's governing body, the University Council. The University Council provides funding on the recommendation of the education committee, otherwise, the project is independent and retains control of its own policy. The Education Commitee is some 25 members strong, and drawn from the following categories:

   - general administrators
   - department heads
   - educationists
   - educational technologists
   - university teachers

2. Van Hees and his colleagues within a multi-institutional project, are directed by a committee of ten.

   There are no general administrators represented. The chairman is the head of dept. of Mechanical Engineering at Eindhoven. Further, there are:

   - one computer scientist.
   - 4 educational technologists (one each from the educational research institutes of 4 cooperating colleges)
   - 3 faculty members using computer assisted instruction (from mechanical engineering, statistics and dentistry)

Others indicate that their teams are small enough to act as a unit, and require no formal committee.

3 report to their own department group committees.

Netherlands Table 6 Main types of resistance

	No. of responses	Comments
Cost	3	- high cost can be an advantage, it keeps the system simple and manageable
Lack of knowledge of CAI	3	- lack of knowledge of the variety of ways computer can be used in education in addition to traditional CAI/CMI - misconception of trends and expected value of known systems, irrational and unargued base
Lack of confidence in CAI	5	- uncertainty of profit of CAI
Inertia	3	- reluctance to study new methods, evaluate them and consider using them
Lack of time to reconstruct courses	5	- time is always difficult to find
Lack of time to learn new techniques	2	- reluctance to find time

A number of individual supplementary comments were made which are likely to be of general significance.

1. The particular problem of establishing a Netherlands project is to secure 'formatie plaatsen' (staff establishment) rather than funds as such. Initial difficulties were lack of human rather than financial resources.
2. One respondent regretted the reluctance on the part of his colleagues and collaborators to develop the framework of the project adequately.
3. One project was hampered by lack of computing time, and it is reported elsewhere that lack of priority for on-line work and slow response times have seriously hampered development.

Netherlands Table 7 Main sources of Resistance

(some multiple entries)

	No. of responses	Comments
Costs and the higher priority of other projects	5	- computer centre steering committee (dominated by users) gives priority to research - within educational science, CAI is a very minor subject - general lack of emphasis on fundamental educational research
Other pressures on teachers	4	- multiplicity of lecturer's tasks, within which teaching has low priority and altering present teaching methods even less

Supplementary comment from Dirkzwager, Amsterdam, is in part reminiscent of that of Howe, Edinburgh, as recorded in the U.K. section, and is also to be interpreted as a plea for better thought-out, coordinated research and development:

'opposition to computer based learning is often common sense, sometimes short-sighted opportunism, incidental narrow-mindedness and provincialism while most of the time striving for quick results and hurrying after most promising fashion trends leads to priorities other than those of our project'.

Netherlands Table 8 Obstacles to teacher cooperation

	No. of affirmative responses	Comments
learning a computer language	0	
learning to construct self-instructional packages	5	- plus reluctance to (learn to) construct test batteries
incentives	5	- growing university resistance to continual innovation - plus fear of promoting redundancy among teachers
no training or follow-up conslutancy	2	- plus lack of demonstration within a reliable system of the functions of the computer in an educational environment
other	3	- the difficulty is, getting teachers to give the time for an initial involvement

Further supplementary comment:

- regretfully, there is a lack of a positive 'sell' with publicity, and creative, effective demonstration programs. Should be closer links with secondary education -

Netherlands Table 9 Transfer

	Use of materials developed elsewhere before own course-ware was developed	Comment
Yes	4	- "of course!"
Limited	1	
No	5	- materials elsewhere unsuitable - programmed instruction, whereas we support lectures

Only one project reported problems viz. technical problems of transfer.

Netherlands Table 10 Use of own materials elsewhere

4 projects report that their materials have been used elsewhere; 2 of which add 'only for demonstration'. 3 of these 4 report no need for adaptation. The third estimated 10% was altered.

Netherlands Table 11 Now that project's own materials have been developed, to what extent are others used?

- At present 1 1
- Plan/prepared to do so 3 (of which 2 cite materials from U.S.A., 1 from the Netherlands)

How much adaptation are you prepared to make?

2: as much as necessary if:
   a. the materials is effective
   b. the process is faster than completely new effort would be

One project confesses to using the ideas of other's materials.

Netherlands Table 12/13 Length and stability of establishment

9 projects reported, one not described.

The projects described (8) all commenced informally, from individual efforts, and have not been sponsored or stimulated to growth from high administrative levels within the universities or from elsewhere.

2 projects describe their work as logical components/developments of concurrent individualisation of instruction, with which they have been able to identify.

2 report relatively self-contained research and development projects which are not anticipated to generate course-ware.

4 describe growth and stabilisation in terms of developing sample materials, seeking cooperation and support from established university departments.

In spite of this apparent informality, 4 of the projects regard themselves as permanent, and 2 are uncertain, one anticipating either permanent establishment or curtailment of activity dependent on evaluation of present work by December 1976.

One has a present life expectancy of 5 years.

The other 2 report that team members are permanenty established, but their program is continuously evaluated and adapted as necessary.

Netherlands Tables 14/15/16 Materials available and utilised, tertiairy level topics

projects with > 200 terminal hours per year	Number of 'lessons'	projects and respondent	topics	other computer administered material
	0-10	Wolbers	- demonstration and to test the system only	
		Vink	- elementary digital circuits	
		Bierman	- psychology - electricity/electronics - demonstration game	
X	10-20	Dirkzwager	- maths, linguistics, problem solving (for research purposes)	
		Nieuwenhuis Camstra	- psychology - instrumentation	CADA Computer Assisted Data Analysis
		Braak	- CMI courses mechanical engineering, statistics, orthodontics	test batteries
		Hees	- CMI courses as above plus economics, social psychology, sociology	data bank 3 test batteries
X	>20	Leiblum, Nijmegen	- computer operations, botany, medicine, statistics	exercises and tests in medical sciences and statistics
X		Moonen	- statistics	data bank for suite of programmes

14

15

12.

Netherlands Table 17 Factors contributing most to success

Within the project group

All the reasons put forward were of an organisational/sociological character rather than technical or economic.

1 - the close cooperation of team members, each having special knowledge in various areas;

1 - educational technologists concerned with educational development rather than educational research;

1 - the appropriateness of research (on algorithms) and its successful development for practical exercises;

2 - the independence of the group/initiatives taken by group members;

Outside the project group

With one exception, the factors outside the project group considered to have contributed most to success were also non-technical:

1 - the growth of student numbers and the establishment of a new department of psychology;

1 - the integration of CAI into regular courses;

1 - student success with materials which also resulted in the saving of time for teachers;

1 - direct contact with interested, cooperating faculty members;

1 - good support from and communication with the university council;

2 - close contact with other universities in and outside the Netherlands;

and

1 - a transportable CAI system

II. 1. Netherlands Purposes of Projects and Units

The reported objectives have been classified under the following headings:

1. Research
2. Educational/technological systems
3. Implementation/Innovation/Dissemination

1. Research:

- the importance of formative evaluation
- learner control vs program control of learning activities
- problem solving
- individual differences and learning styles ('aptitude-treatment interactions')

2. Educational/technological systems

- 5: programming languages characteristics in education
- 5: systems/software specifications for computers in education
- the student terminal
- the establishment of a CMI system as support for an ISS oriented curriculum
- the establishment of a computer software system to support individualized instruction
- computer-based responsive environment in education

3. Implementation/Innovation/Dissemination

- 2: establishment of CAI as a demonstration for staff and students
- 3: investigation of the effectiveness of CAI in different subject areas
- encouragement of CAI as an educational medium
- dissemination of CAI information/documentation
- provision of internal/external courses on CAI
- 2: liaison with other institutes
- problems and strategies of innovation with computers

NOTE:
Thus, there were no responses in the categories of financial/cost-benefit objectives.

Most projects concentrated their objectives into one or other of the above categories, although there were multiple responses from almost all projects.

There is an emphasis on objectives concerning related and underlying issues rather than on production of teaching materials at this stage; although this underlying issues are not always obviously connected with concurrent developemts in educational practice.

The following tables indicate how the objectives expressed were arrived at, and how suggested underlying reasons for the development of computer based learning systems were ranked.

II. 2a. Netherlands — How objectives were arrived at

Several respondents indicated above that they had no formal list of objectives, and 20 commented here that their objectives had evolved with their projects.

Of the 3 respondents with formal lists of objectives, one stated that these were arrived at by internal group discussion and evaluation. Two added to this that objectives were a more or less personal or group choice following study of the literature and other projects to identify factors leading to general problems and inefficiency in the use of computers in education.

None of the projects had objectives imposed upon them by external funding organisation or high level administrators.

II. 2b. Netherlands — Which of the objectives reported are considered to be of most importance?

2 - main objective to learn about the possible impact of computer in human learning

2 - establishment of an appropriate system

2 - program development

II. 3 Netherlands — Rated importance of suggested reasons for developing computer based learning

Key
High — rated 1-3
Mid — rated 4-6
Low — rated 7 or below, or not checked at all by projects responding to other suggested comments.

III. 3 Rated importance of suggested reasons for developing computer based learning

	high	medium	low	comment
a) research on student learning	2	2	3	- not an objective, but a valuable by-product
b) individualization of instruction	7	1	-	- CMI is a means to individualize instruction, which leads to goals g, f, c,d and h
c) mastery learning	3	2	3	
d) evaluation of course elements	2	2	4	
e) effecting organisational change	-	-	8	
f) increasing capacity of educational provision	2	2	4	
g) increasing teaching effectiveness	2	2	4	
h) decreasing student's learning time	1	1	6	
i) decreasing teacher's teaching time	3	1	4	
j) decreasing teacher's record-keeping time	1	2	5	
other:'giving greater freedom and responsibility to students	1			- difficult to indicate. All are important, almost equally so, and all ask for specialised facilities outside CAI/CMI

NOTE

The responses to this question reflect much of the current difficulty concerning computer based learning at this time.

More of the suggested objectives underlying computer based learning were rejected than selected, but there was only one alternative offered.

There was universal agreement on the importance of "individualisation of instruction", and yet total rejection of "organisational change" as an objective, which individualisation of instruction ought, surely, to imply.

Support for the other suggested objectives was fairly evenly scattered.

Dirkswager's reluctance to indicate priorities, with the added comment that "all objectives mentioned are important, generally equally so, but each askes for specialised facilities not necessarily coverd by the terms CAI/CMI" may reflect a more general feeling that the objectives of computer based learning are specific to particular environments.

These responses can also be taken to reflect the individual manner in which projects have established themselves and set their own objectives, and activities in comparative isolation from each other.

IV. Netherlands — Training of non-specialists and consultancy services

1. Initial Training Courses

One project reported an established course, with 10 members per course, and 2 courses per year.

Two projects offer personal advice and supervision for beginners on a one-to-one basis, of which one is developing a Handbook to be published during 1977.

Two projects plan courses for the future.

2. Further consultancy

One project offers consultancy services in instructional design and evaluation.

Two projects refer to the availability of consultancy services elsewhere - their computer centre for programming, and educational research bureau for instructional design.

V. Netherlands. Course-ware development

V.1. Decision Basis for Topic Selection

a) Who decides?

2 - Project staff and practising teacher

3 - Project staff alone (possibly one individual, possibly group)

1 - Teacher alone

Several projects indicate 'not (yet) relevant'.

b) Criteria?

2 - Does the teaching task really require CAI? (comparative flexibility, interactive information handling capacity, individual pacing of CAI can be exploited)

1 - conformity to an instructional prototype (is there an algorithm necessary?)

1 - dependent on research interests of individual team member

Two projects give no criteria.

One project utilises a structured check list which teaching staff are required to answer, to provide a decision basis for the project staff.

V.2 Netherlands Who contructs the packages?

Three projects gave multiple responses.
Three projects indicated 'not applicable'.

	Yes	Occasionally	Comment
specialist alone	1		
teachers plus specialists	6		
teachers alone	2		
students in conjunction with any of the above	2	1	

Of the 'specialists' in 1 and 2, six projects specified educational psychologists, and 2 computer/CAI specialists.

V.3 Netherlands — Who sets the package in courseware?

Those who construct the packages also did this, so that answers correspond to question 2. above.

V.4 Netherlands — Courseware Development

4.1 Who evaluates the courseware developed?

external agency	1	educational research bureau
specialist within the project	2	
teachers and project staff who developed the package	3	2 - project staff includes educational researcher 1 - plus students

4.2 How? (several multiple responses)

records of student responses and other program events maintained by the software	2
student post tests and transfer tests	5
student questionnaires	4
student interviews	none
student learning time	1
discussion with teachers	1
subjective examination by project staff	1

4. Netherlands Project evaluation

With what results?

There is little summary comment other than:

3 - not yet known to be published
3 - generally favourable

VI. Netherlands Expectations of computer-based learning

1. configuration (some multiple responses, usually with comparative comment)

	Number of responses	Comments
Big stand-alone (CAI dedicated or mixed)	4	- the minis won't make it. People are used to having vast amounts of information at their disposal - dedicated
Stand-alone dedicated mini (or micro)	2	- and/or stand-alone intelligent student terminals eg. with microprocessor and some storage (Wolbers)
computers in networks	7	- a 'network' approach for the Netherlands would be useful

VI. Netherlands — Expectations of computer-based learning

2. Terminals

(some multiple entries)

	Yes	Possibly	No	Comments
Paper	3	-	1	
V.D.U.	8	-	-	
Plasma	5	1	-	- linked to other peripherals (random access/Video/micro-fiche etc.) - mostly TV, particularly as random access techniques develop
T.V.	6	-	-	

3. Systems Software

	Yes	Comments
standard languages	2	
CAI languages	2	
mixed development	7	- 3: a programming language environment should have various available languages - 1: special purpose languages required - 1: more different classes of problems in future, therefore more languages required"

4. Lesson Style, Development and Interchange

	No. of responses	Comments
Test administration	5	
Drill and Practice	7	- for Open Schools socially deprived, using simple techniques
Simple Techniques	7	
Complex Learning	6	- e.g. 2: problem solving 2: simulation 1: data base 'laboratory'use

5. Development

	No. of responses		Comments
	Yes	No	
Individual	1	1	
team	9	-	- 2: teacher+CAI expert + educational psychologist + graphics artist/AVA experts 2: teacher + CAI expert + educational psychologist 1: teacher + CAI expert 1: teacher + educational psychologist
commercial company			

VI. Netherlands — Expectations of computer-based learning

6. Interchange

Where?

No clear answer - comments such as 'I wish I knew'.

How?

- difficult - I'm not optimistic. There are too many individuals, each with their own ideas about what should be in a lesson package;
- There is a need for coordinated course development on the faculty side, with a formal allotment of time for program development in teams;
- Keep the big companies out, and build adequate translation routines, because standardization of systems will never be achieved;
- standardization of author languages;
- portable CAI system software;
- 3: publications, documentation;
- 2: central distribution and collection point/register;
- networks

VI. Netherlands — Commitment and further free comment

Two projects replied with (multiple) question marks.

Three indicated serious further involvement and identified with the developments within which they were working and foreseen trends.